XII. *On the structure and use of the submaxillary odoriferous gland in the genus Crocodilus.* *By* THOMAS BELL, *Esq. F. L. S. G. S. Communicated by Sir* EVERARD HOME, *Bart. V. P. R. S.*

Read March 1, 1827.

FEW subjects connected with comparative anatomy and physiology have received less of careful and minute investigation than the structure and functions of those glands which produce *anomalous secretions*. The structure of those *general* organs, which are adapted to the functions of whole classes of animals, has, in all their modifications, been again and again examined and described; and in many instances little perhaps remains to be ascertained. But with regard to those secretions which belong to individual species, or to smaller groups, and which are formed only for the performance of a function required by their peculiar and exclusive habits, comparatively little information has hitherto been acquired. A detailed examination of each individual structure will be necessary to the establishment of any correct general views, or accurate classification of them; and every discovery, even of an isolated fact, exclusive of what individual interest it may possess, becomes of increased importance, from its possible relations to other analogous structures. In order to illustrate the truth of this remark, it is only necessary to refer to the laborious and profound investigations of SIR EVERARD HOME, whose Papers in the Philosophical Transactions have so much

extended our information on some of the most intricate subjects of comparative anatomy and physiology—the result principally of a minute examination of individual and peculiar structures. I make no apology therefore for the following short communication, to which the foregoing observations are, to a certain extent, applicable.

It has long been known, that beneath the lower jaw of the alligator and crocodile, there is situated, on each side, a gland, the office of which is to secrete an unctuous substance, having a strong musky odour: but although anatomists have not been ignorant of the existence of such a gland, our information has hitherto rested here, whilst its structure, and the apparatus connected with it, appear not to have been investigated, nor has any probable object of such a formation been suggested. In a careful examination however of this remarkable organ, which I made about two years since, I discovered a peculiarity of structure, which, as far as I have learnt, is without a parallel in the glandular system of animals, unless, as Sir EVERARD HOME has kindly suggested, the muscle, which is described by Dr. RUSSELL* as governing the poison gland in serpents, may be considered as in some measure analogous. The description of this structure, with which repeated subsequent dissections have made me more particularly acquainted, I now have the honour to submit to the Royal Society.

It is necessary to premise, that my observations have hitherto been confined to the common alligator of America.†

The external orifice of the gland, through which the secre-

* Ind. Serp. vol. i. p. 90. t. 46.

† Crocodilus Lucius. CUV:

tion passes, is situated about two thirds of the length of the lower jaw backwards from the symphysis. It consists of a longitudinal slit in the integuments, a little within the edge of the basis of the jaw. The scales with which it is immediately surrounded are much smaller than those which cover the neighbouring parts; and it is generally concealed by a duplicature of the integuments, so that the skin requires to be extended laterally before it can be brought into view. Through this opening exudes an unctuous substance of a consistence somewhat like suet, of a brownish colour, and with a powerful odour exactly resembling that of musk.

Having kept two of these animals for several months, I made occasional observations on this secretion, and found, as might have been expected, that during the warm weather, while they fed freely, and when all their functions were more perfectly developed, I could at any time procure it by slightly pressing the gland with the finger; but that in the winter, notwithstanding they were almost constantly kept in a room with a fire, and daily placed in warm water, it was greatly diminished in quantity, and its odour much less powerful.

On removing the integuments, the gland itself is seen closely attached to the skin, and lying between it and the under surface of the tongue. It consists of a simple follicle or sac, of a bluish colour, elongated and somewhat pyriform in its shape. In the alligators which I have dissected, and which have not exceeded four feet in length, the gland has been about half an inch long, and the sixth of an inch in diameter, its base being directed obliquely forwards and outwards. On cutting open the follicle, the internal surface is

found to be lined with a soft, light-coloured, secreting membrane.

The most remarkable part of this apparatus remains to be described. The gland is enveloped by extremely fine delicate muscular fibres, disposed in an oblique or spiral direction, and consisting of two fasciculi, one of which passes over, and the other underneath the gland, each partially surrounding it, whilst a few fibres are spread on the cellular tissue and skin, to which the gland is thus slightly attached. At the base of the gland the fibres converge, and form a long, slender, round muscle, which after making a slight curve forwards, proceeds directly back to the *cornu* of the *os hyoïdes*, to which it is closely united. Throughout the greater part of its length it follows the course of a muscle apparently identical with the *mylo-hyoïdeus* in the mammifera, lying in contact with its anterior edge.

The use of the singular muscle I have described, appears to be twofold. It is obvious that the oblique position of the gland in a state of rest must prevent, or at least greatly impede the free passage of the secretion from the interior; but the longitudinal contraction of the muscle would tend to draw the base of the gland backwards and inwards, and having thus brought its axis in a direct line with the opening, would facilitate the exit of the musk; whilst, by the action of the fibres which surround the fundus of the gland, that organ would itself be compressed, and the secretion forced through the opening at the will of the animal.

When the *situation* of this gland is compared with that of other odoriferous glands occurring in various tribes of animals, so remarkable a discrepancy in this respect necessarily

strikes us as indicative of some peculiar object to be attained by it. The secretion of powerful odours is generally confined, in other animals, to the neighbourhood of the generative organs; and we find glands of this description on each side the *cloaca*, even in the animal now under consideration. These must be considered in some cases as furnishing a defence against the attacks of enemies, and in others, as serving some office connected with the sexual function. In the present instance, however, these objects are obviously incompatible with the situation of the gland, and we must seek for some other use to which the secretion may be applied, in accordance with this peculiarity.

The predilection of many species of fish for all strongly odorous substances, is well known to every one who has observed the habits of this class of animals, and is often made subservient to the objects of the angler. From the earliest periods, in fact, at which angling was considered as a sport, and rules laid down for its successful prosecution, baits were directed to be imbued with strongly scented oils and extracts, for the purpose of rendering them more attractive. In a book printed by Wynkyn de Worde, in 1496, and which is a republication of the celebrated book of St. Albans, with the addition of "The treatyse of Fysshynge wyth an Angle," the following direction is given, amongst others, for taking pike. "Take a frosshe (frog) and put it in asa fetida, and caste it in the water wyth a corde and a corke, and ye shall not fayl of hym. And yf ye lyst to have a good sporte, thenne tye the corde to a gose fote; and ye shall se gode halynge whether the gose or the pyke shall have the better." Walton, and every subsequent writer on angling, has given

receipts for the composition of pastes for the same purpose, in all of which tar, assa fœtida, camphor, oil of rhodium, musk, or some other powerful odour is the most important ingredient.

These facts strikingly coincide with the mode in which the alligators take their prey, as far as the observations I had an opportunity of making on those in my possession enable me to judge. This is done by suddenly snapping at it sideways, a mode perfectly consistent with the form of the mouth and the position of the eyes, and not less so with the situation of the gland itself, the secretion from which, would attract the fish directly to that part where they would become the most certain and easy prey. From all these circumstances then I am led to conclude, that the use of this secretion is to serve as an attractive bait for fish, which form the principal food of these animals. Sir EVERARD HOME, indeed, mentions a curious circumstance, which came under his own observation whilst resident in the island of Jamaica, and which led him to believe that their favourite food consists of birds. Although, however, it is certain that they will devour any animals that come within their reach, yet their aquatic habits seem to indicate that fish constitute their principal nourishment, whilst the observations of many writers, and especially those of BARTRAM,* abundantly confirm this opinion.

* Travels in the Carolinas and Georgia.

EXPLANATION OF PLATE XI.

Fig. 1. A view of the under part of the lower jaw and throat of the alligator, showing the openings of the musk glands (*a. a.*)

Fig. 2. The parts dissected.

a. The musk gland.

b. The muscle of the gland.

c. Its insertion into the *cornu* of the *os hyoïdes.*

d. The *mylo hyoïdeus.*

Fig. 1.

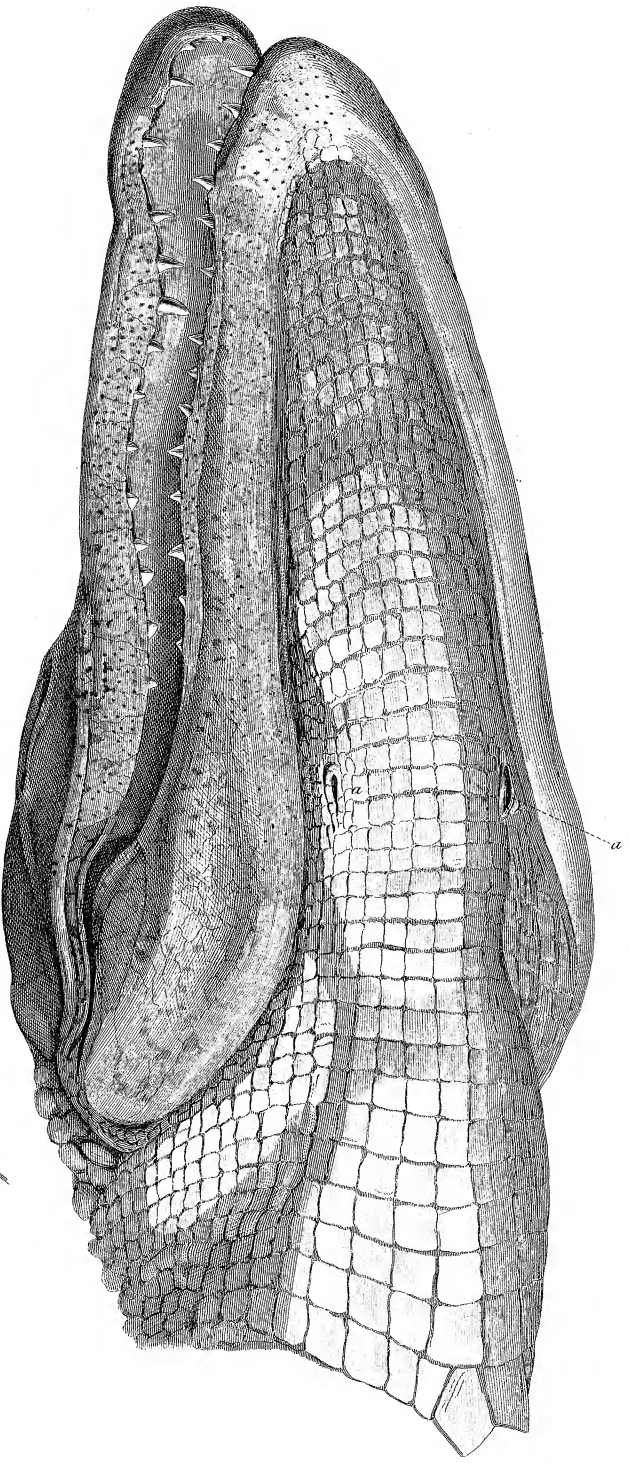

Fig. 2.